

Name: _____

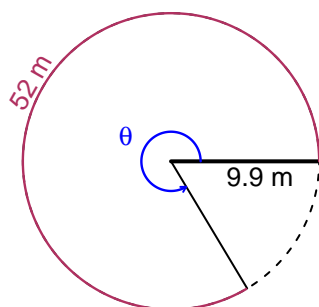
Date: _____

Trig Final (SLTN v603)

- You can use a calculator (like [Desmos](#))
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 52 meters. The radius is 9.9 meters. What is the angle measure in radians?

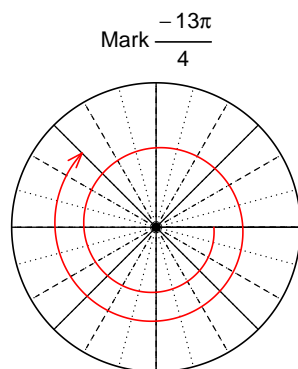


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$$\theta = 5.253 \text{ radians.}$$

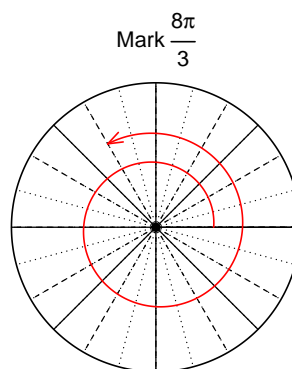
Question 2

Consider angles $-\frac{13\pi}{4}$ and $\frac{8\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(-\frac{13\pi}{4}\right)$ and $\sin\left(\frac{8\pi}{3}\right)$ by using a unit circle (provided separately).



Find $\cos(-13\pi/4)$

$$\cos(-13\pi/4) = \frac{-\sqrt{2}}{2}$$



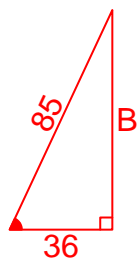
Find $\sin(8\pi/3)$

$$\sin(8\pi/3) = \frac{\sqrt{3}}{2}$$

Question 3

If $\cos(\theta) = \frac{-36}{85}$, and θ is in quadrant II, determine an exact value for $\sin(\theta)$.

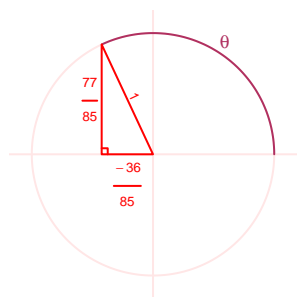
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}36^2 + B^2 &= 85^2 \\ B &= \sqrt{85^2 - 36^2} \\ B &= 77\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\sin(\theta) = \frac{77}{85}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 6.62 meters, a midline at $y = 2.34$ meters, and a frequency of 3.73 Hz. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 6.62 \sin(2\pi 3.73t) + 2.34$$

or

$$y = 6.62 \sin(7.46\pi t) + 2.34$$

or

$$y = 6.62 \sin(23.44t) + 2.34$$